Marine Corps C4I Integration Architectural Strategic Plan

By Mr. J. D. Wilson

Overview

The Marine Corps migration to an "end-to-end" Marine Air Ground Task Force (MAGTF) command and control (C2) strategy requires an equally dynamic strategic plan for C2 and communications, computers and intelligence (C4I) architectural development. This article outlines the proposed methods to analyze the material procurements and technology insertions necessary to transition our current enterprise C4I architecture to support the new MAGTF C2 concept of operations (CONOPS).

Mapping Capability to Architecture

The Marine Corps Combat Development Command (MCCDC) has developed a five-layer MAGTF C2 reference model to represent the necessary "… end-to-end, fully integrated, cross-functional set of MAGTF C2 capabilities." The Deputy Commander, for C4I Integration (C4II) at the Marine Corps Systems Command (MCSC), works with the MCCDC command and control infrastructure (C2I) and Headquarters Marine Corps (HQMC) C4 to identify the connectivity interfaces between these layers and ensures the identified material solutions create a fully integrated environment.

Grouping the reference model layers by function provides "C2 capability categories" that can be used to describe architectural "gaps and overlaps." With these categories, standard language can be employed to describe architectural investment needs. For example, to achieve a certain C2 end state potential by a certain date, more "operational bandwidth – satellite systems" or "enterprise service – network storage" may be specifically addressed.

Many of the 546 programs of record (POR) overseen by C4I are that of users of the C2 capability versus providers. Platforms, such as, tanks or an Assault Amphibian Vehicle Personnel (AAVP) need connectivity to the C4I architecture, but their primary focus is another combat function like fires or maneuver. These users access C2 capabilities by embedding C4II material solutions like communications, network services, applications or end user devices in their platform. By assigning each POR a C4I material solution category every system procured can be traced to one of the C2 capability categories, as illustrated in Figure 1.

Architecture Integration

The connectivity interfaces that link the layers are the glue binding the disparate systems together into a fully integrated C4II architecture. To design the interfaces of the Marine Corps architecture, the technologies used in the configuration of the material solutions must be analyzed. The data for this analysis is taken from the Department of Defense Architectural Framework systems views and technical views. Understanding these views enables the strategic planner to recommend when new technology insertion is required or how it will impact the current architectural structure.

As the Marine Corps moves toward the end-to-end MAGTF C2 strategy there are three mutually supporting frameworks that must be defined. The first, and probably the most difficult, is the provision of command and control systems interoperability.

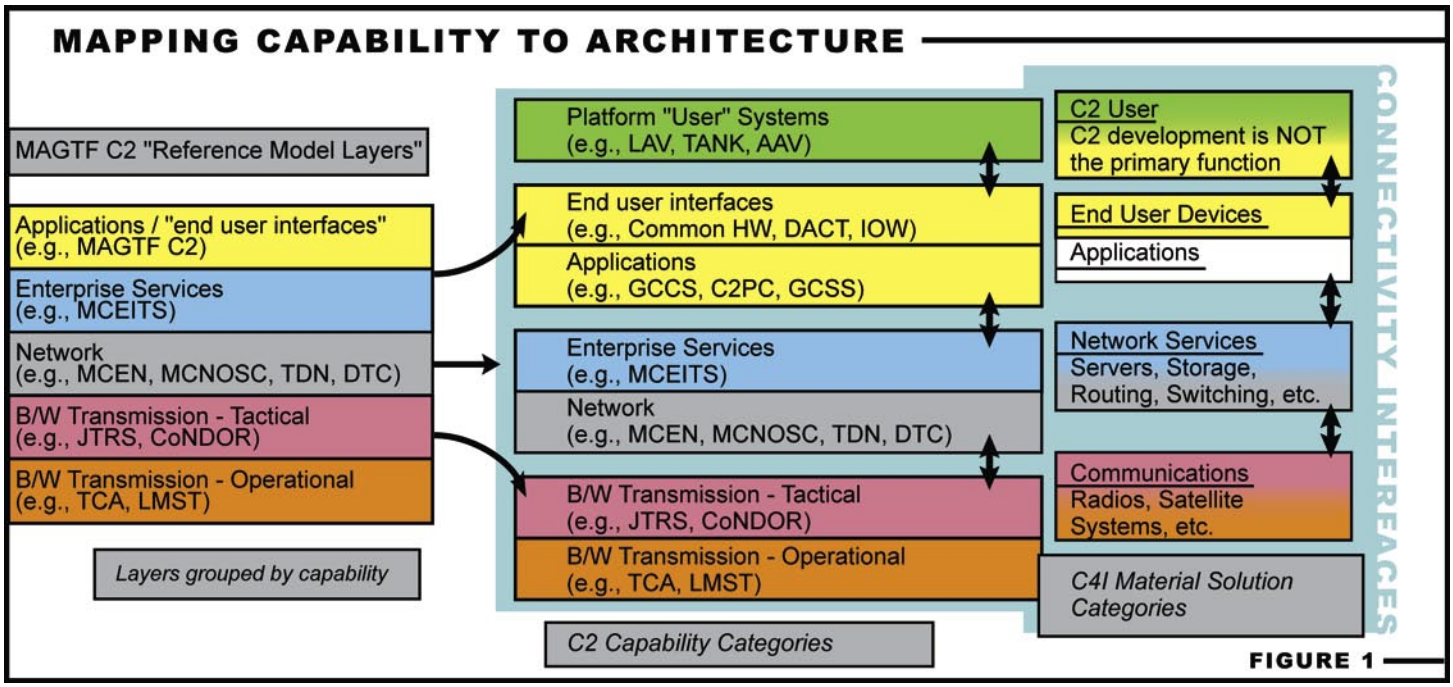
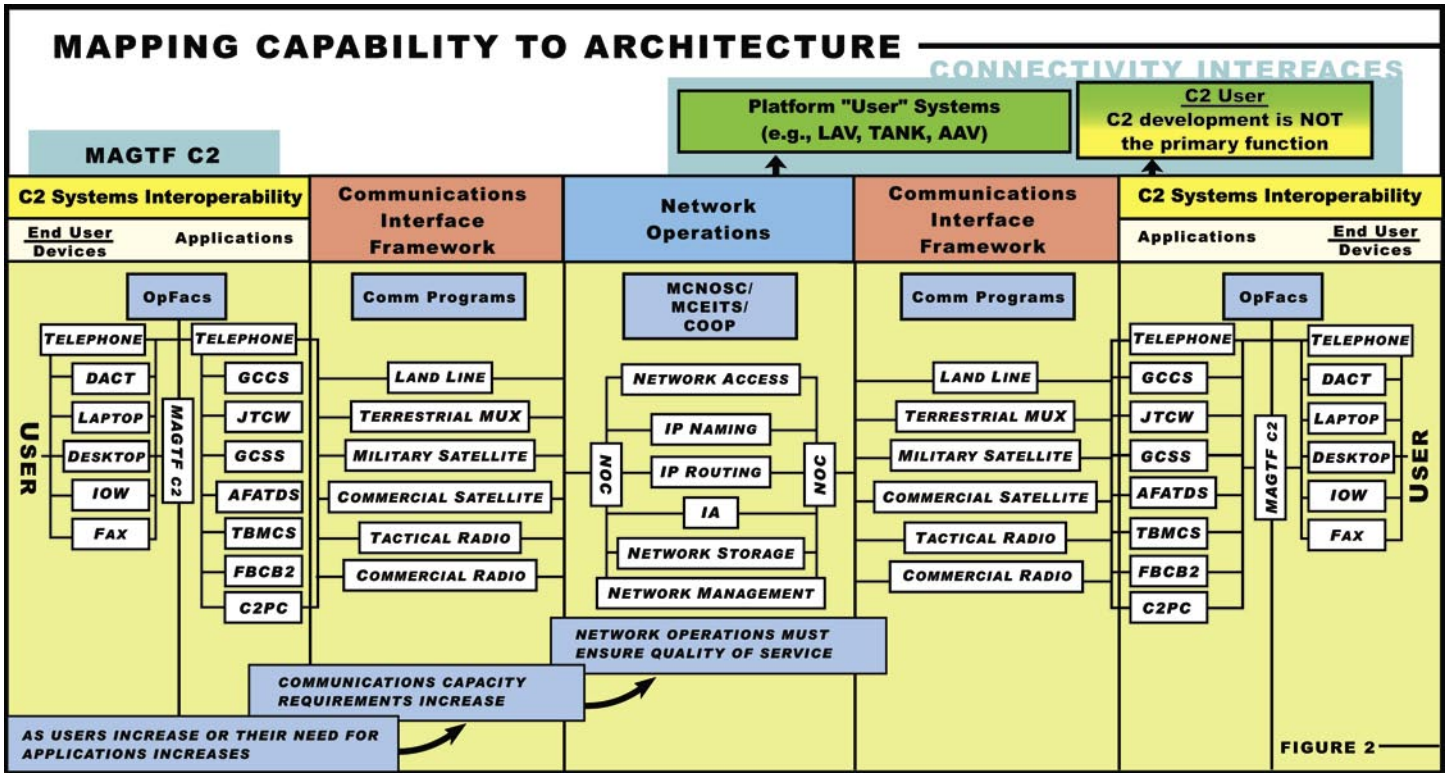


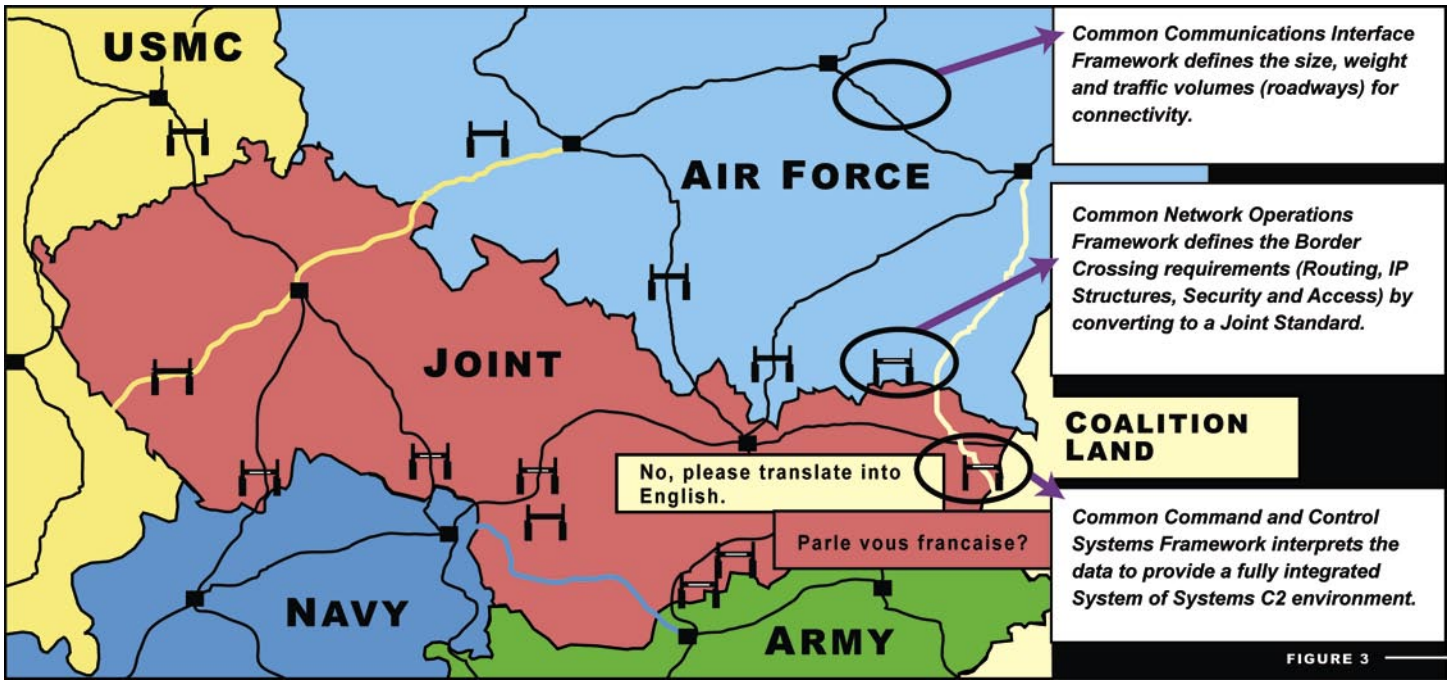
FIGURE 1

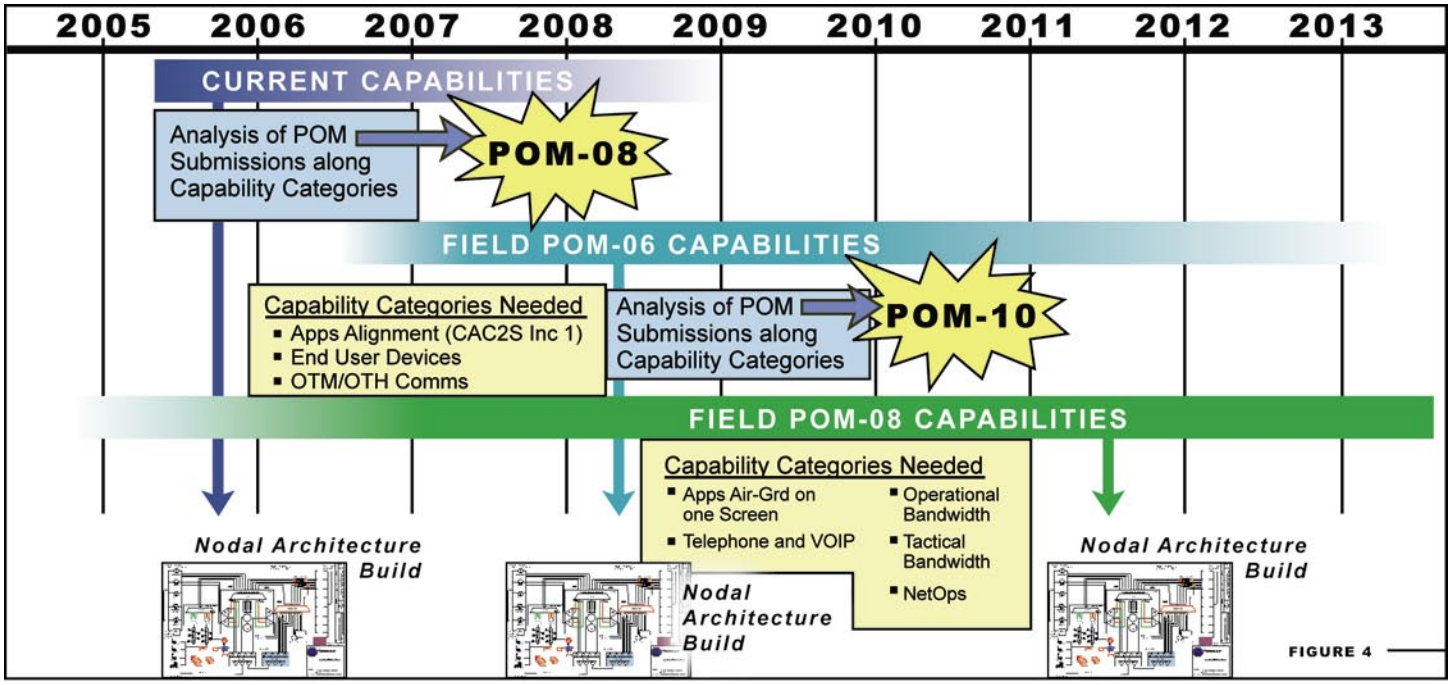


This framework identifies the methods used by the user to access data from a fully integrated system of systems. This framework is the cornerstone of the MAGTF C2 strategy and the joint command and control (JC2) effort. This could be envisioned as a translator at the United Nations, who ensures everyone understands what is said, regardless of the language spoken. This concept is illustrated in Figure 2.

The second framework defines an environment of common communications interfaces that describes the physical connectivity between disparate communication carrier systems. The Navy and Air Force have expressed interest in becoming signatories on an expanded memorandum of agreement (MOA) modeled after the Army/Marine Corps Common Communications Architecture.

Additionally, support to describe and evaluate communications access schema and the technical attributes required of this framework is being provided under the Office of Naval Research (ONR) sponsored Joint Virtual Laboratory-Network (JVL-N) effort.





Aligning each of the legacy systems, core programs and new initiatives with a capability category enables systems engineering and integration planners to analyze the capability they provide against the Marine Corps future architectural needs.

With the MOA between the services agreeing to collaborate on a common communications framework and the ability to test and model the approach through JVL-N, the physical connectivity interfaces can be standardized. This framework could be thought of as the state and interstate road network built to support the size, weight and traffic volume of the trucks moving their payloads between two or more sovereign countries. This concept is shown in Figure 3.

The last is a common network operations framework that defines the interfaces and tactics, techniques and procedures (TTPs) required for a dynamic network: security access and disassociation of users. Each of the services' architectures, FORCEnet, LandWarNet, Constellation Net, have unique network access requirements and, when applied within a combatant commander's region, must be coalesced into a Joint Annex K for theater-wide connection to the Global Information Grid.

MCCDC command and control infrastructure group presented this problem to the Senior Advisory Council of the Joint Test and Evaluation Program Office, and the Marine Corps was assigned as the lead for a new Joint Feasibility Study (JFS) known as the Joint Mobile Network Operations (JMNO) JFS. This Office of the Secretary of Defense funded effort will quantitatively analyze each of the services and coalition partners' network operations methods to determine the best of breed to create a common set of joint TTPs.

This evaluation, once charted as a joint test, is planned to be conducted at the Marine Corps Tactical Systems Support Activity (MCTSSA) using the Defense Research and Engineering Network (DREN) to connect the U.S. Joint Forces Command (USJFCOM) and services test facilities, such as the Central Technical Support Facility (CTSF), Space and Naval Warfare Systems Command (SPAWAR) and Langley Air Force Base to evaluate the proper joint network operations methods. This framework could be envisioned as the border crossing requirements between two or more sovereign countries. Data can be distributed uniquely within the separate countries, but must be converted to a standard network operations and security structure to pass between.

POM Alignment

Aligning each of the legacy systems, core programs and new initiatives with a capability category enables systems engineering and integration planners to analyze the capability they provide against the Marine Corps future architectural needs. This facilitates a proactive analysis of the systems and technical views to demonstrate how the system will integrate into the next generation MAGTF C2 nodal architectural build. It also provides a quantitative method to assist in the gap/overlap analysis necessary to support the Program Objective Memorandum (POM) Evaluation Group and POM Working Group reviews.

Using this process, the Marine Corps will be able to anticipate what capabilities are required to achieve the level of subscribers and service necessary at a given MAGTF C2 node to make informed decisions concerning investment offsets as shown in Figure 4.

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